Farming in Tsetse Controlled Areas

FITCA

Environmental Monitoring and Management Component

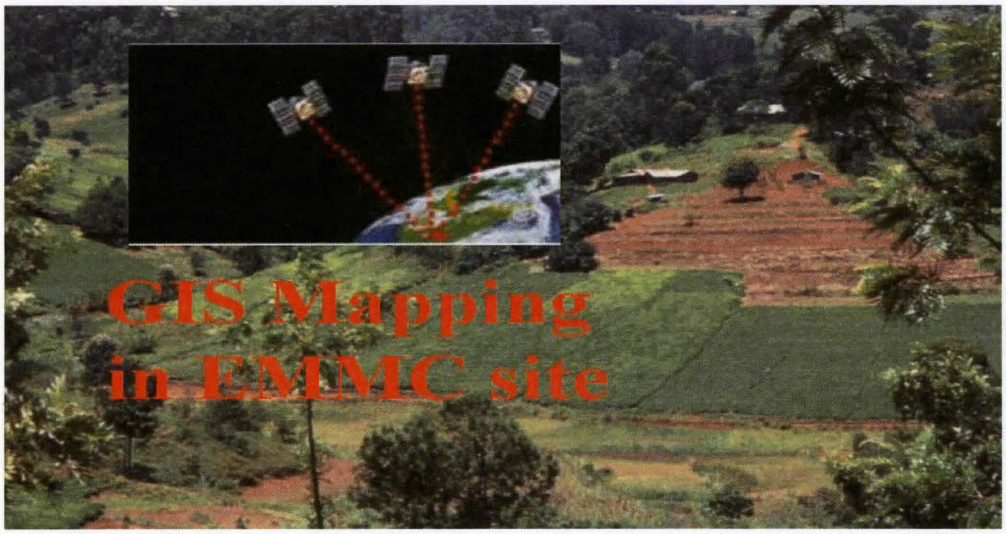
E M M C

Project Number : 7.ACP.RP.R. 578

Atlas of FITCA-EMMC track mapping of selected sites in Kenya and Uganda.

Evanson Njuguna, Joseph Matere, Joseph Maitima

December 2003



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Overview: EMMC

Introduction

Control of trypanosomosis increases the efficiency of oxen so those farmers can plough more land in areas with low compared with high disease prevalence. In many cases, control of animal trypanosomosis acts as magnet for human migration. People move to new lands after they are freed of the tsetse fly. If this disease is controlled, there are almost certainly environmental consequences resulting from the expansion of cultivation and livestock numbers, such as habitat loss and species extinction, a net release of CO_2 to the atmosphere and loss of vegetative cover that protects soil structure and fertility. Farmers often burn vegetation in the process of clearing land, which further releases harmful greenhouse gases. Land cover changes can also affect regional-scale hydrology and climatology. These general environmental concerns apply to the specific project areas in the different countries as follows:

In Kenya and Uganda, much of the proposed project areas are already densely populated. The landscape is heavily used for agriculture and the potential for further agricultural expansion is limited. However, there are other small patches of vegetation that people have avoided using, principally because of the threat of contracting diseases. These areas, which experience low use, include riparian corridors, swamps and wetlands. These are the very habitats that are richest in species and can become overused when the constraint of trypanosomosis is lifted. These areas will be one of the first focuses of the environmental monitoring (environmentally sensitive areas) of indirect impacts at the Kenyan and Ugandan sites.

"Monitoring of project impacts needs to feed directly into strengthening the ability of communities to take action to sustain their natural resources. Without this connection, monitoring has no impact on the rural poor. A series of techniques have been developed to involve communities in monitoring and to empower them to better manage their natural resources. The overall objective is to increase the sustainability of natural resources and agricultural systems, through environmental monitoring and management, in participating FITCA countries. The twin objectives of increasing productivity to improve human welfare and to sustain those gains over the long term are at the core of the objectives of the agricultural sector in each country. The EMMC project purpose is to increase the level of information and awareness of environmental change and increase the capacity to respond proactively to these changes among stakeholders in FITCA participating countries."(EMMC Report 2002)

KENYA

Introduction

FITCA Kenya selected to work in Western Kenya and in only five districts, which include Busia, Teso, Bungoma, Bondo and Siaya. Western Kenya is a densely populated area. Agriculture is the main activity in this region. Farmers produce cereals, cassava, pulses for consumption and local market, sugar, tobacco and pepper as cash crop.

This region has in the past been seriously affected by animal trypanosomosis and now rarely by sleeping sickness. FITCA -Kenya project started in 1999. It promotes the participation of farmers to tsetse control activities through adoption and self-use of two major techniques:

- In diary production, the use of impregnated permanent nets around the barns where the dairy cows stay. Two hundred farmers have been identified and receive convenient material, insecticide and extension service.

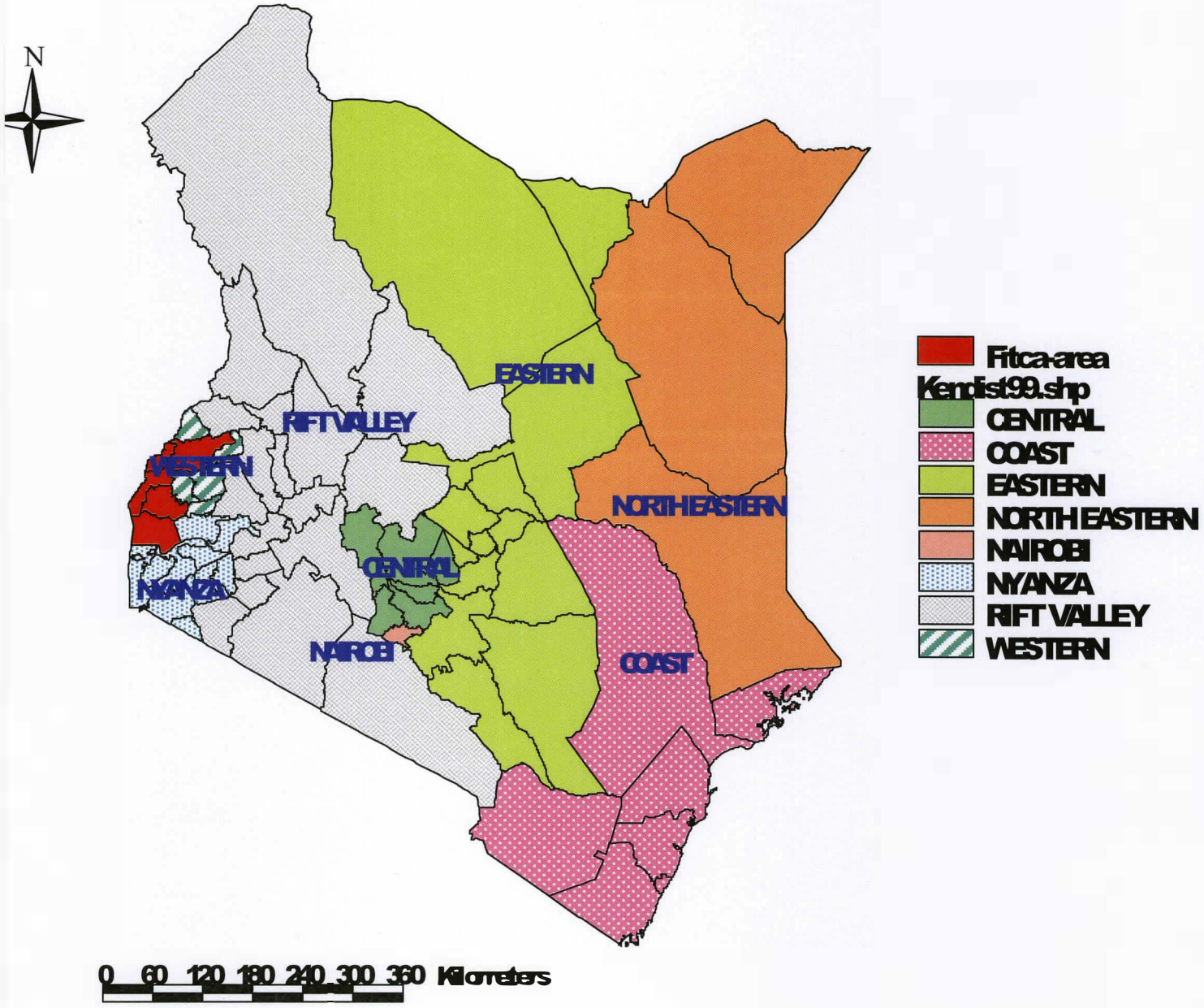
- In non-diary livestock rearing areas cattle are impregnated with insecticide by spraying in a crush pan. These are like living targets, able to poison the flies.

Field observations in Angurai location (Teso district, Kenya) strongly support the hypothesis of an animal trypanosomosis epidemic with severe mortalities (87% animal losses according to statistics of the livestock services).

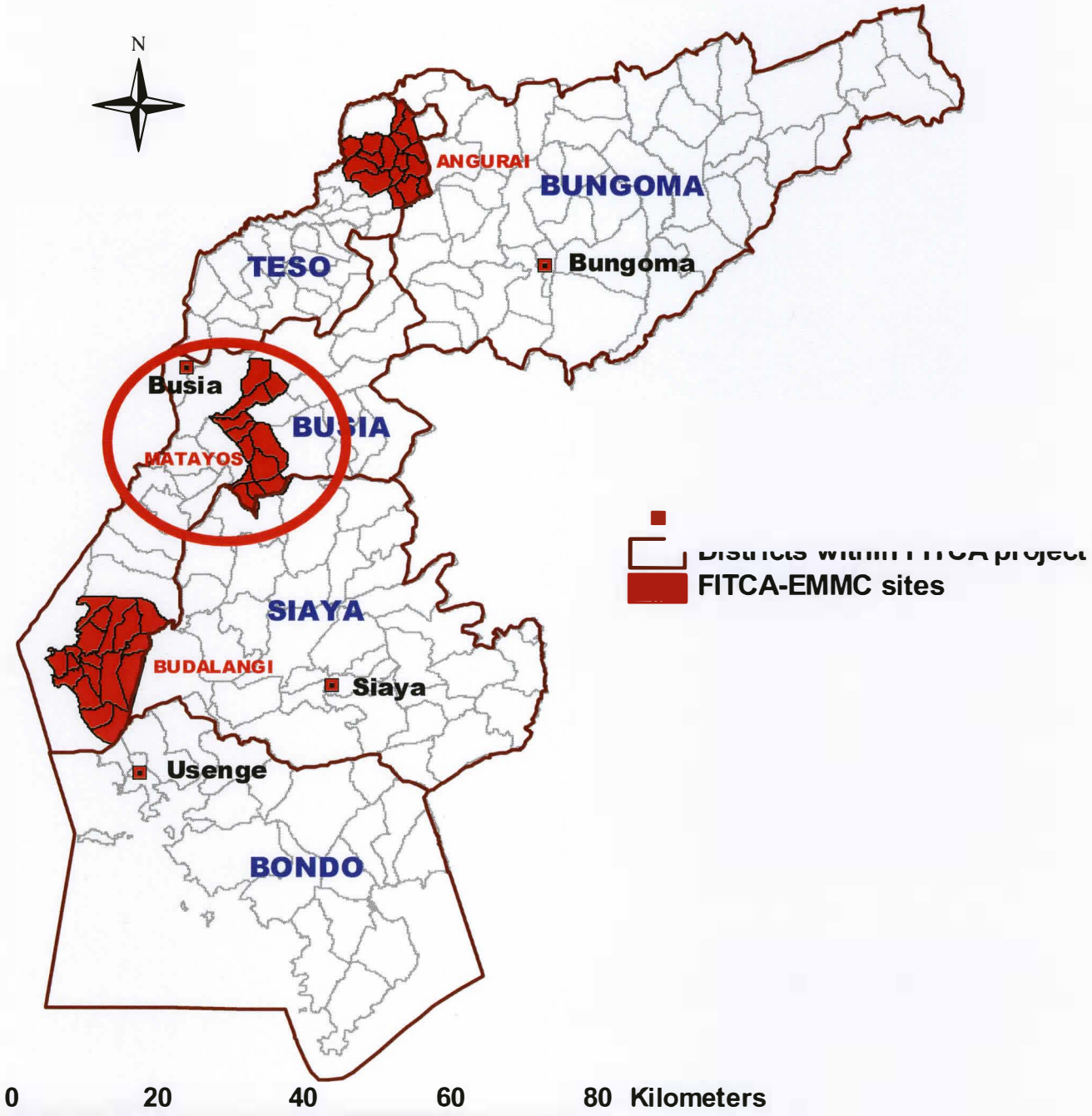
Tsetse population has been brought to low levels following the on going control program by FITCA Kenya. It's expected that the livestock population might rise and thus traction power for cultivation. This might bring changes in the environment and therefore a need for monitoring in order to identify the changes and develop a system to mitigate the negative changes.

This study is designed to provide the baseline data and a landscape map showing the cropping pattern, vegetation, soil and settlement of the study area, which can allow follow up and comparison with other areas in future.

MAP 1: KENYA EMMC SITES



MAP2 BUSIA EMMC SITE



Overview: Busia

Busia Township is one of the three EMMC study sites in Busia and Teso districts of western Kenya province (Map 2). The two districts are the most westerly of the province bordering Uganda and Lake Victoria. Western Kenya is a densely populated area. Agriculture is the main activity in this region. Farmers produce cereals and cassava for consumption and for local market while sugar and tobacco are the main cash crops. Farmers also keep both grade and local breed cattle.

Within the study site, FITCA is promoting zero grazing by introducing treated nets around cattle pens in zero grazing units. The expected associated indicators of change include conversion of existing land use (e.g. fallow and bushes) into Napier grass and other fodder plants.

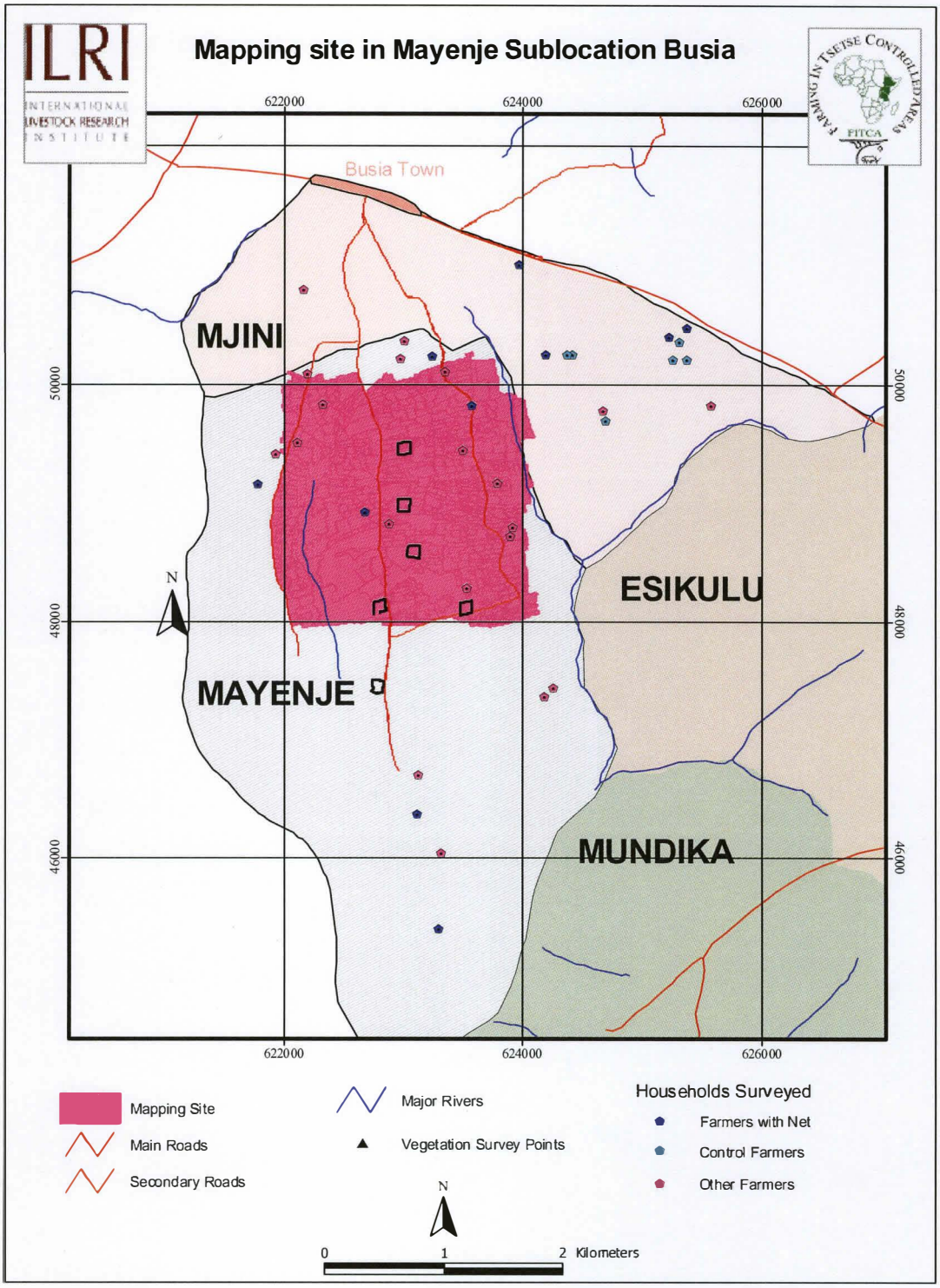
Study area

The mapping site is located in Mayenje sub-location of Township location in Busia district (Map 3). The mapped area is within 4 Km from Busia town centre. Environmental concerns in these areas include direct impacts on non-target insects like flies and others that come into contact with the nets. Some of these impacts might affect beneficial insects like bees and butterflies.

The indirect impacts associated with zero grazing units are: Conversion of fallow into Napier grass and other fodder plants. This will be a change from less managed to more managed ecosystems with certain impacts on biodiversity, land cover and soils.

Map 3 depicts the mapping sites with GPS'ed households and adjacent sub locations. Map 4 depicts the generalized land use classes in Busia followed by Map 5, which represents a more detailed outlook of the land use in the surveyed area. Table 1 gives a precursor of the raw data generated from the survey, while Figure 1 presents the raw data in graphical form.

MAP 3: MAPPING SITE IN BUSIA TOWNSHIP



MAP 4: MAJOR LAND USE CLASSES BUSIA TOWNSHIP

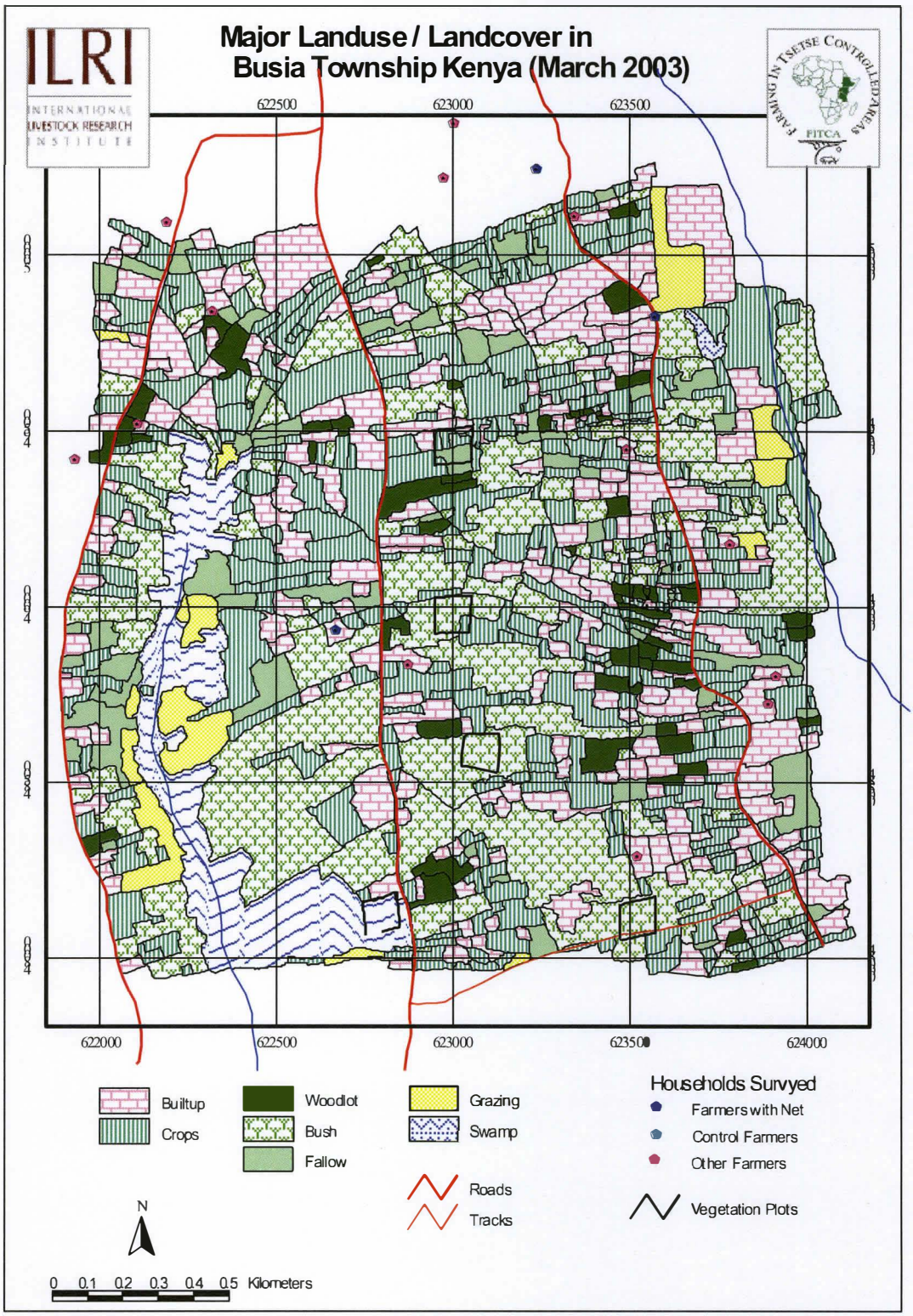
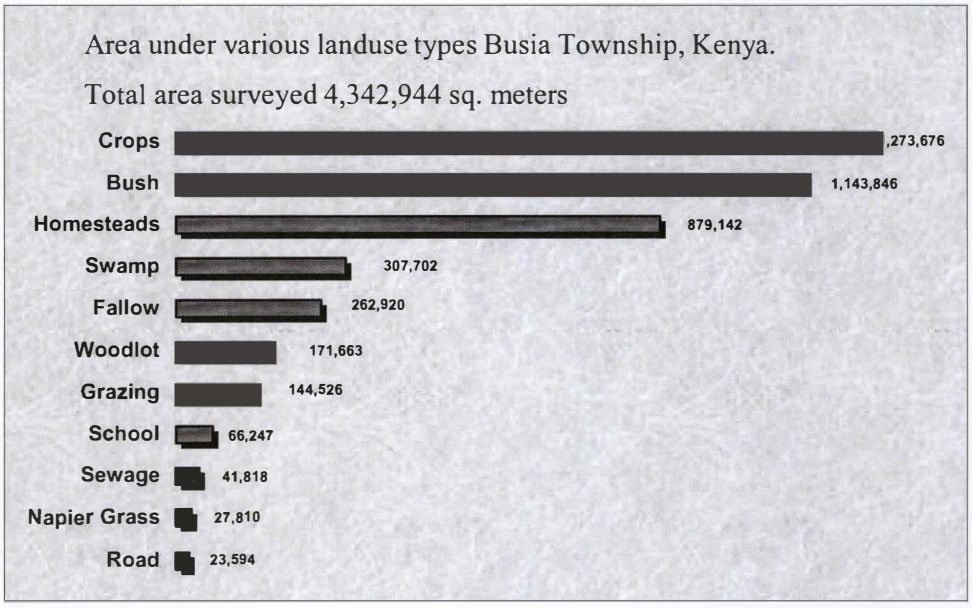


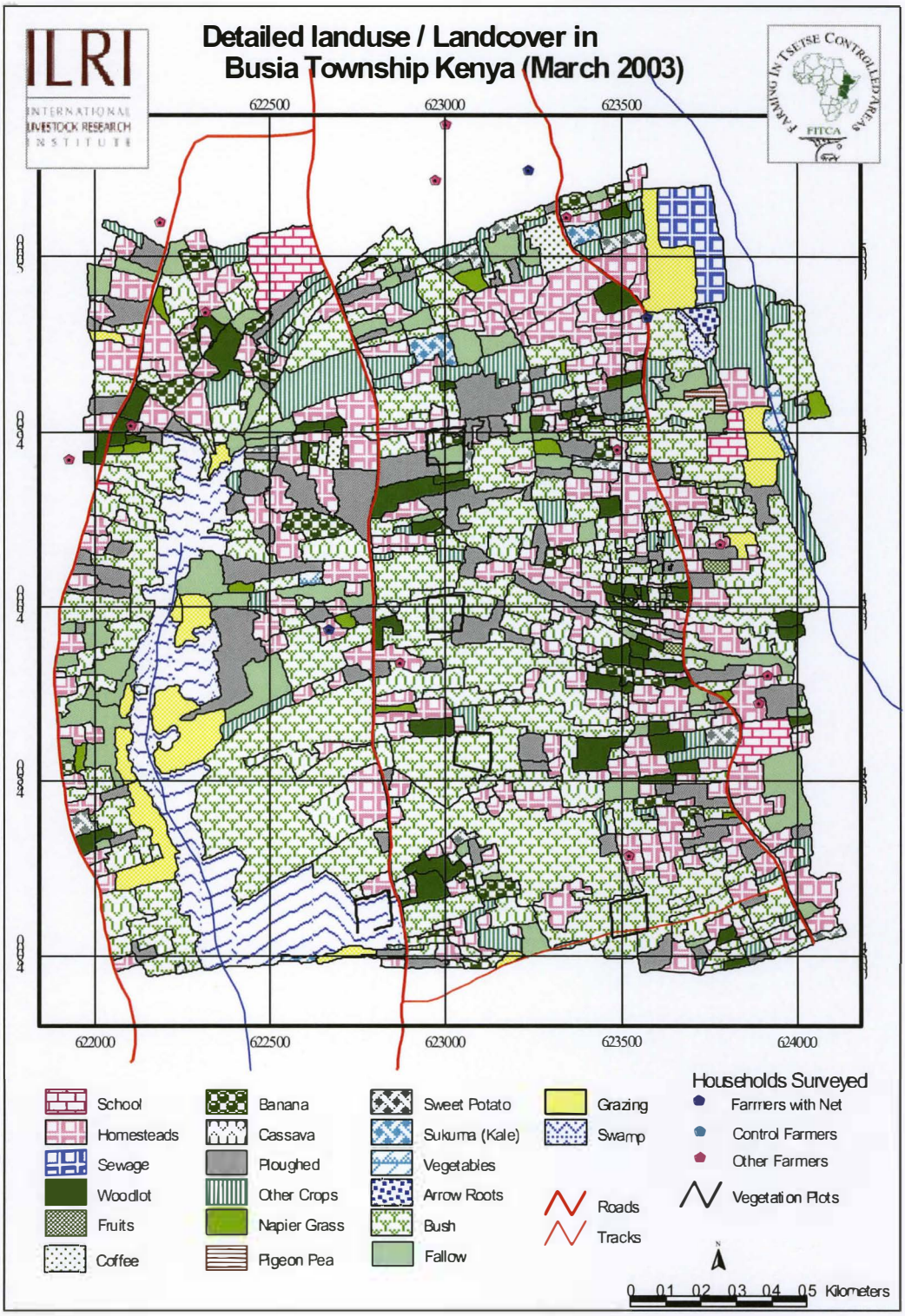
TABLE 1: MAJOR LAND USE AREA COVER (BUSIA TOWNSHIP)

Cover Type	Area in (M^2)	Ratio of total	Percentage of Total
Grazing	144,526	0.03	3.32
Woodlot	171,663	0.04	3.95
Fallow	262,920	0.06	6.05
Swamp	307,702	0.07	7.08
Infra +Home	1,010,800	0.23	23.27
Bush	1,143,846	0.26	26.33
All Crops	1,301,486	0.30	29.96
Totals	4,342,942	1.00	100.00

FIGURE 1: BAR GRAPH OF AREA COVER



MAP 5: DETAILED LAND USE CLASSES BUSIA TOWNSHIP



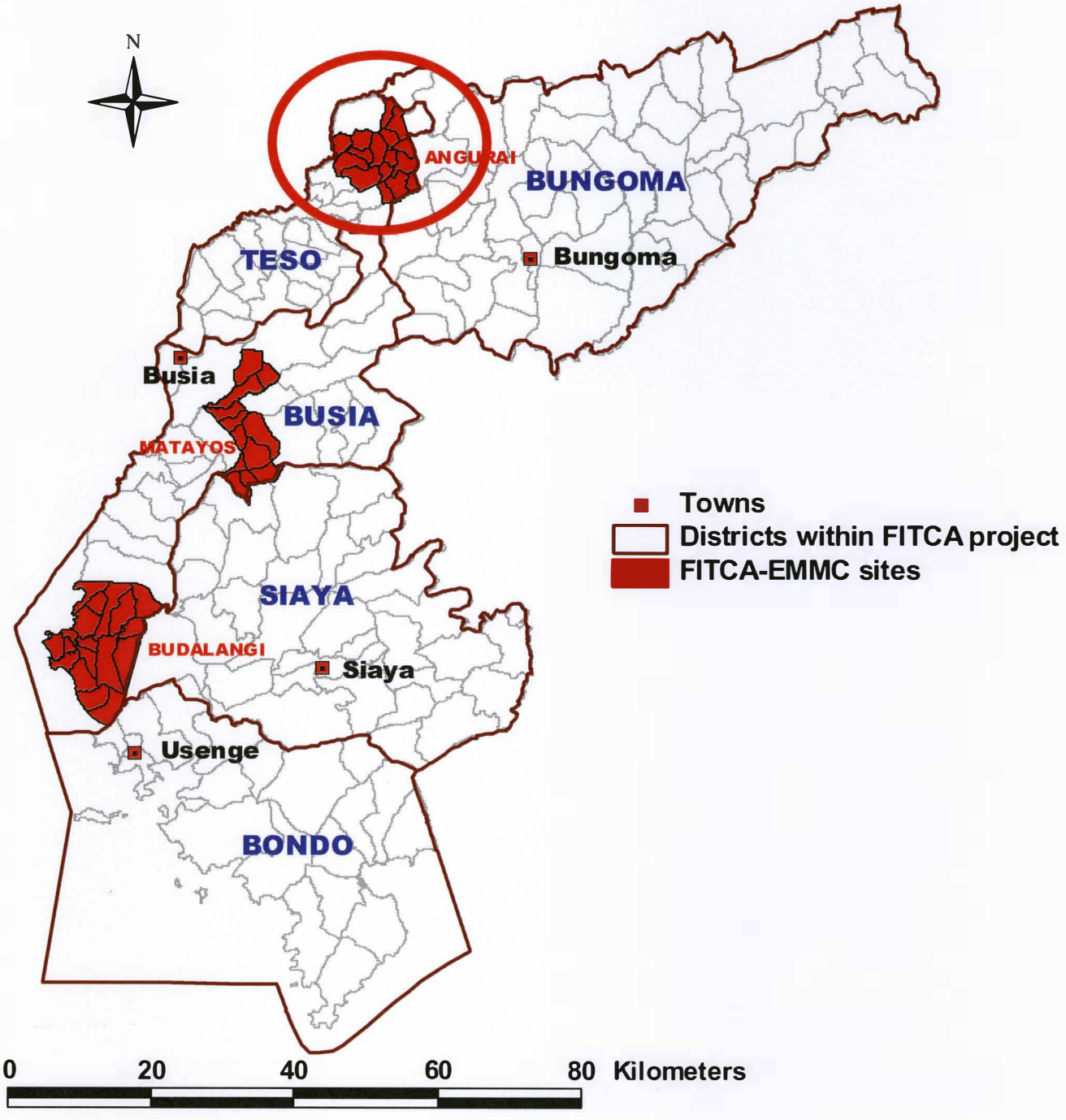
Overview: Katotoi

Teso district's altitude ranges from 1300m above sea level in the south to an average of 1500m in the central and northern parts (Katotoi village in Angurai division is in the northern part of the district). There are several hills rising above the general level. The topography is undulating with hilly terrain in some parts (Government of Kenya, 1997-2001). Katotoi area of the district is characterised by numerous bushes of *Lantana camara* that grows as fallow in abandoned farmlands, roadsides and bushes along streams and river Malaba. These are known tsetse habitats and are expected to reduce due to increased cultivation and grazing.The population of Teso district as given in 1989 population census is 126,584. With a population growth rate of 3.5% per year, the population is projected to rise to 167,487 in 1997 and to 192,656 in 2001.

Owing to the elevation of Teso to a fully-fledged district, it's expected that rapid growth rates are likely to occur in the future as more people from outside the district will settle to work or carry out business ventures.The population of Teso district is evenly distributed with large concentration in the main centers like Malaba and Amukura.Among the four divisions of the district (i.e. Amagoro, Amukura, Angurai and Chakol), Amagoro had the highest population density (413 persons/km2) in 1997 projected to increase to 475 persons/km2 in 2001. The divisions with low population density are Amukura followed by Angurai (Government of Kenya, 1997-2001).

The Northern zone in Teso district is hilly and densely populated. The Katotoi region of the district is under urgent trypanosomosis control because of the high density of tsetse. In this region, animal diseases (mainly trypanosomiasis) seriously reduced the livestock numbers. Following FITCA intervention the use of traps and targets has reduced the tsetse density. This was selected as one of the EMMC sites given the attributes described in the overview.Map 6 depicts the location of Katotoi EMMC site, maps 7 and 8 depict the land use classes at the site showing major and detailed land use patterns, table 2 highlights land use statistics while figure 2 is an analysis of cropping patterns during the last decade.

MAP 6: LOCATION OF EMMC SITE: KATOTOI.



MAP 7: MAJOR LAND USE CLASSES IN KATOTOI.

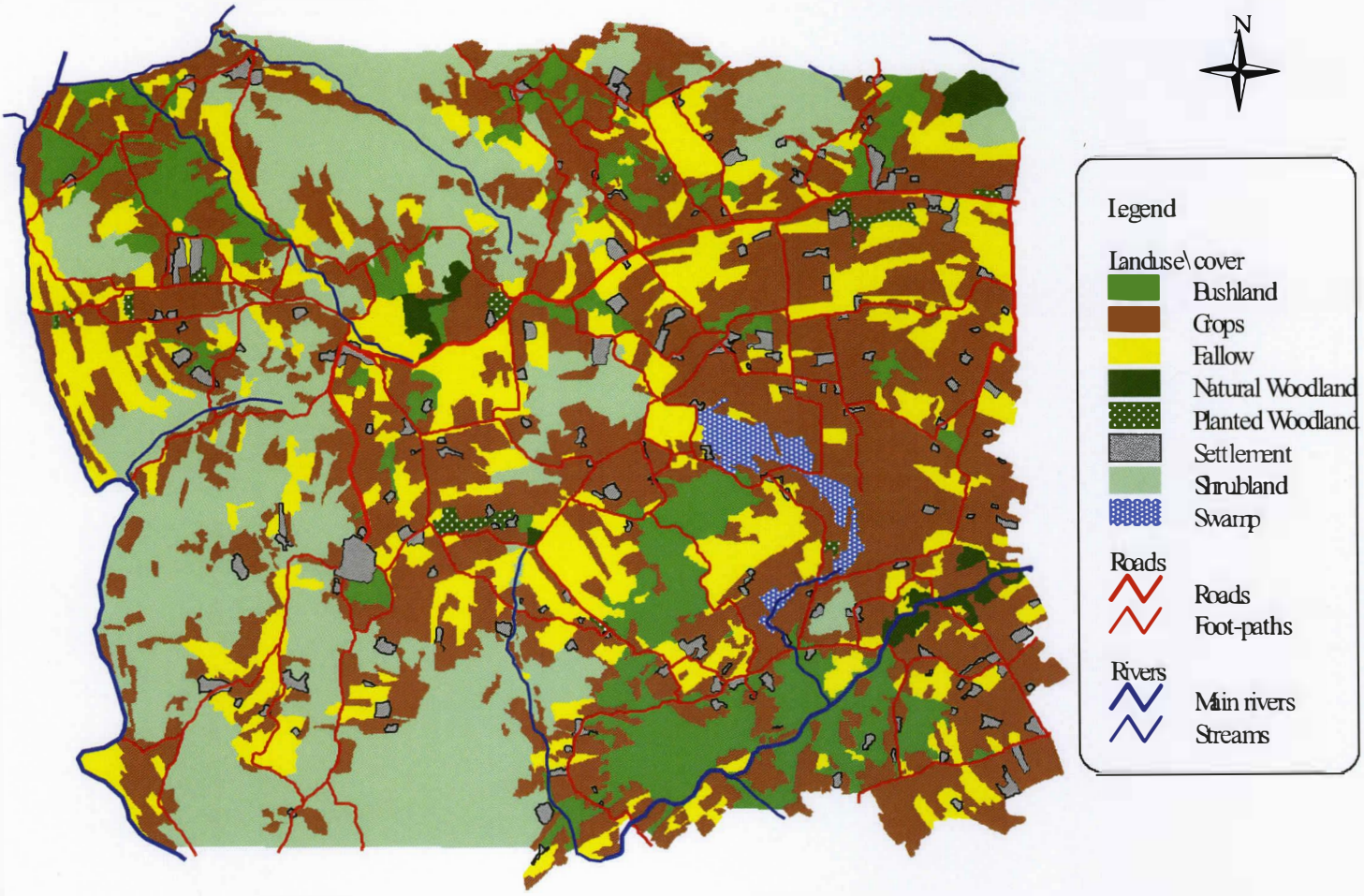
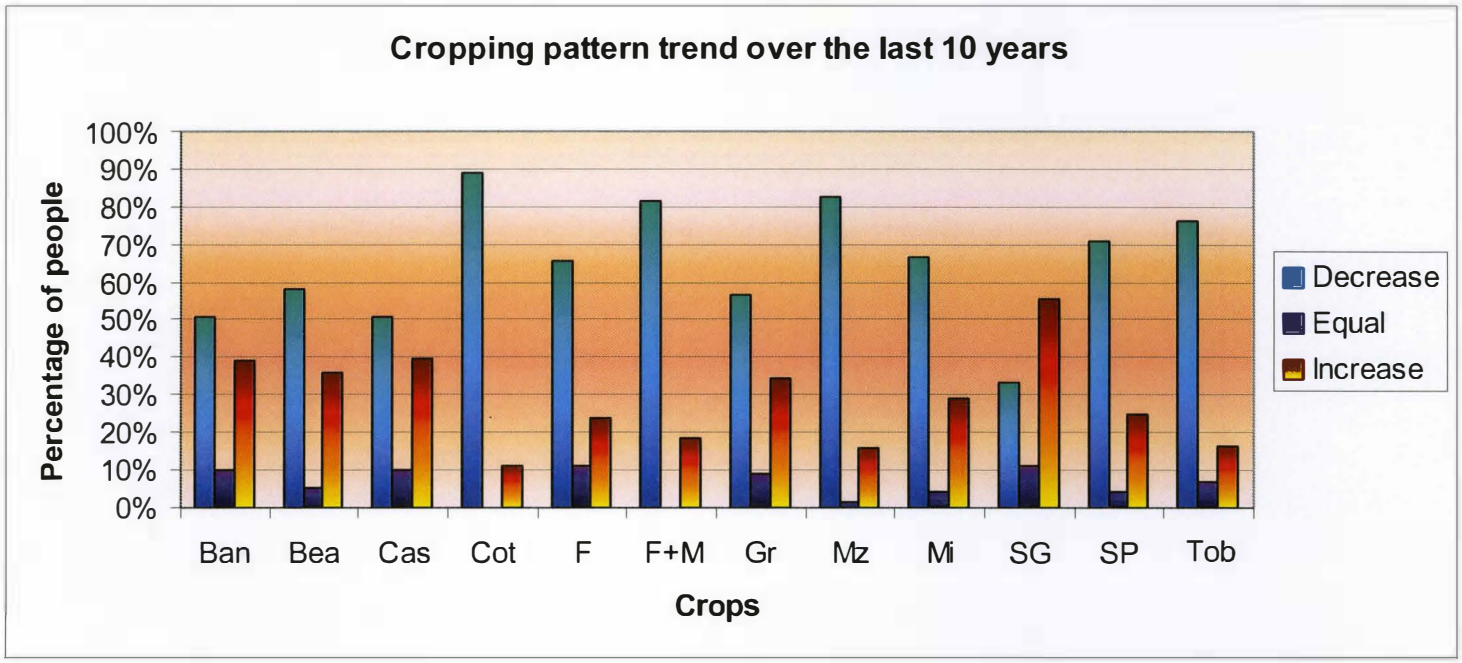


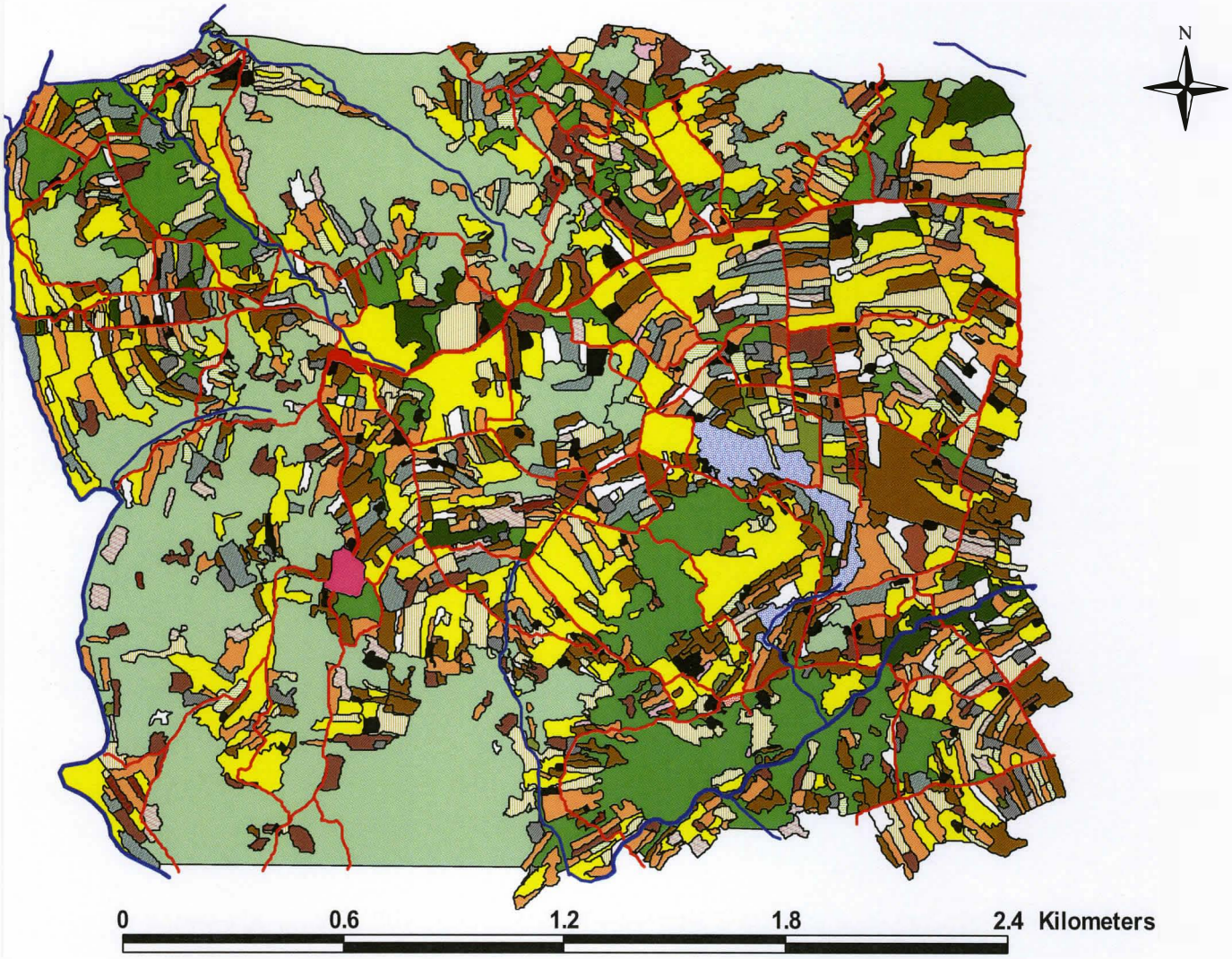
TABLE 2: CROPPED LAND STATISTICS IN KATOTOI

CROP TYPE	PERCENTAGE OF AREA OF TOTAL CROPPED LAND
CASSAVA	23%
MAIZE	18%
TOBACCO	8%
FINGER MILLET, SORGHUM MIXTURE	8%
FINGER MILLET	4%
GROUND NUTS	3%
BANANA	2%
OTHER CROP	34%
TOTAL	100%

FIGURE 2: CROPPING PATTERN IN KATOTOI.



MAP 8: DETAILED LAND USE CLASSES KATOTOI



UGANDA

Introduction

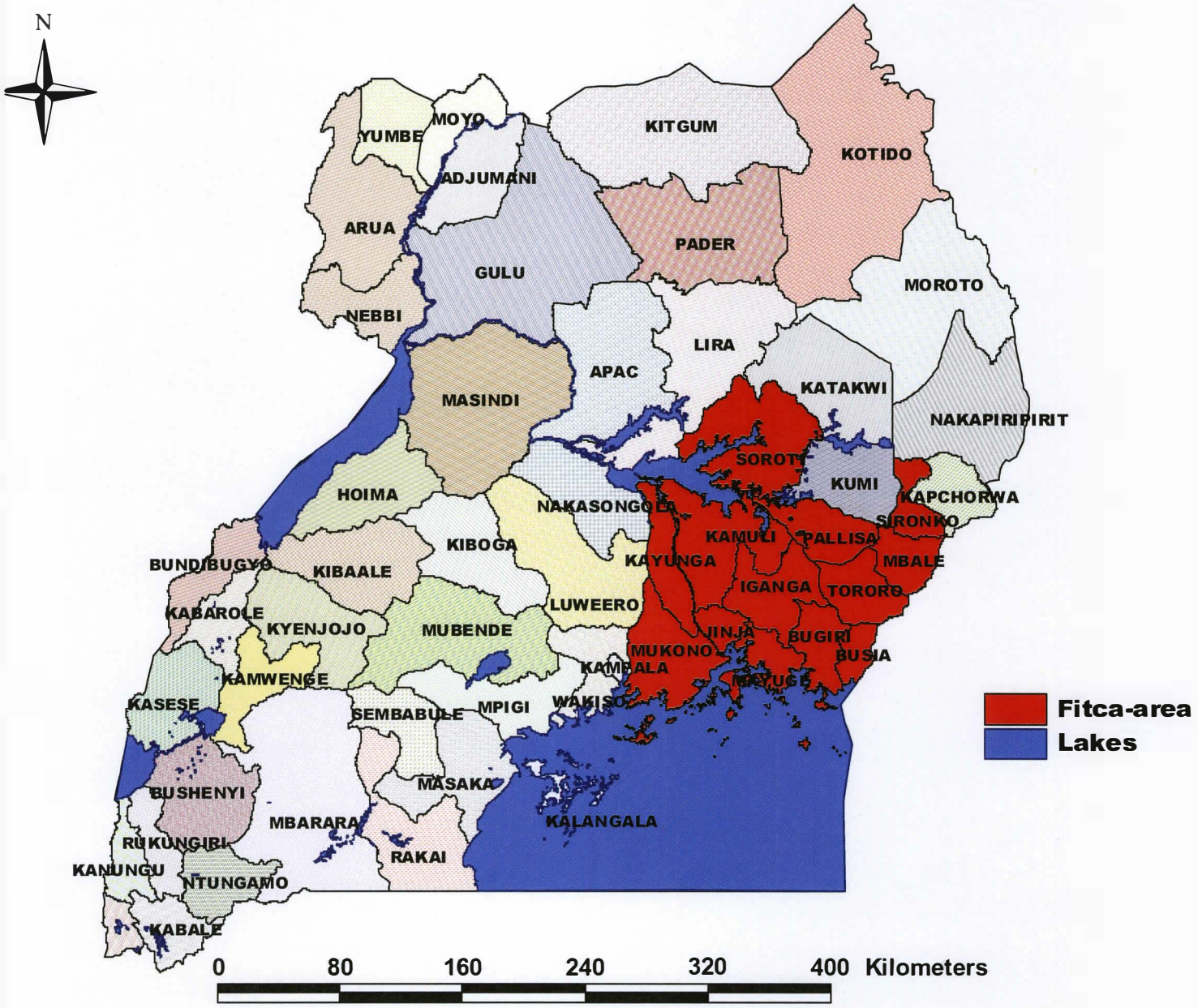
The project in Uganda covers 12 districts. Each district it employs a district entomologists and a tsetse fly assistant. The project assists the farmer communities to undertake actions against tsetse fly and organizes training, focusing on distribution of materials and insecticide for traps, crush pen building, pour on spraying and veterinary services.

Uganda is endowed with a rich natural resources base including reliable rainfall regimes, fertile soils and water resources. The largest proportion of the country (43%) is covered by natural vegetation or secondly woodland, bush land / grassland and 2.5% is under the cover of tropical high forests. The rest of the country, about 20%, is covered by water bodies and wetlands (NEMA, 1996). Over 90% of Uganda's population is rural and depends directly on natural resources for their livelihoods. The country's current level of socio-economic development and its prospects for sustainable development are dependent on its natural resource endowment. About 40% of Uganda's economy depends on subsistence production. An estimated 54% of the country's Gross Domestic Product (GDP) comes from agriculture (Grant and Weitz, 1991)

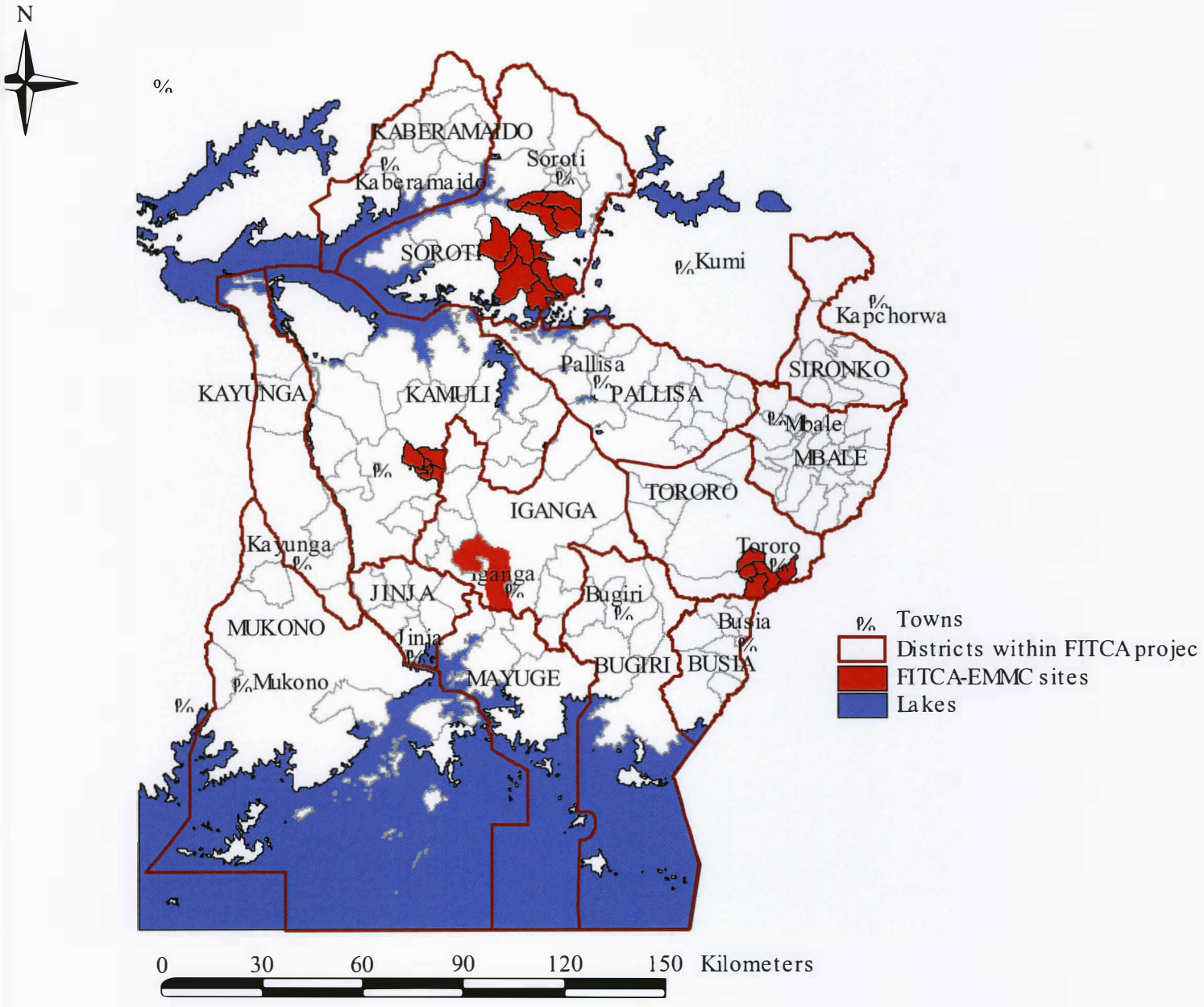
Uganda's population has been increasing since records began. For example, national population censuses have revealed that there were 2,500,000 Ugandans in 1911; 2,850,000 in 1921; 3,5400,000 in 1931; 4,958,000 in 1948; 6,500,000 in 1959; 9,500,000 in 1969; 12,600,000 in 1980; 16,600,000 in 1991 and 24,600,000 in 2002 (New Vision, Vol. 17, No. 239, 2002). It is estimated that Ugandans will be 32,500,000 by the year 2015 (Population Secretariat, 1992). Given such ever-increasing human population in a country that has a low technological base, it is logical to conclude that pressure on finite natural resources has been increasing with increasing populations over the last 100 years.

In Uganda, four sites have been selected. Selection of sites in Uganda has been complicated by the diversity of background issues (Maps 9 and 10). FITCA efforts in Uganda are mainly targeting reduction of human trypanosomosis rather than livestock.

MAP 9: UGANDA EMMC DISTRICTS



MAP 10 UGANDA EMMC SITES



Overview: Bubaka

Bubaka is one of the four EMMC study areas in Uganda located in Iganga District of Uganda (Map 11). It is highly settled and widely cultivated with the natural areas consisting of swamps and young fallows. The area that had been identified earlier for EMMC survey work in Iganga district was Bulongo Sub County. This was later changed to Bubaka after realising that FITCA work had not started in Bulongo but some project work was going on in Bubaka. The area has very low incidences of human sleeping sickness. FITCA is encouraging farmers to keep cattle for milk products as well as for animal traction. The major indicators of change expected are the conversion of existing land use and cover types to fodder crops and grazing lands.

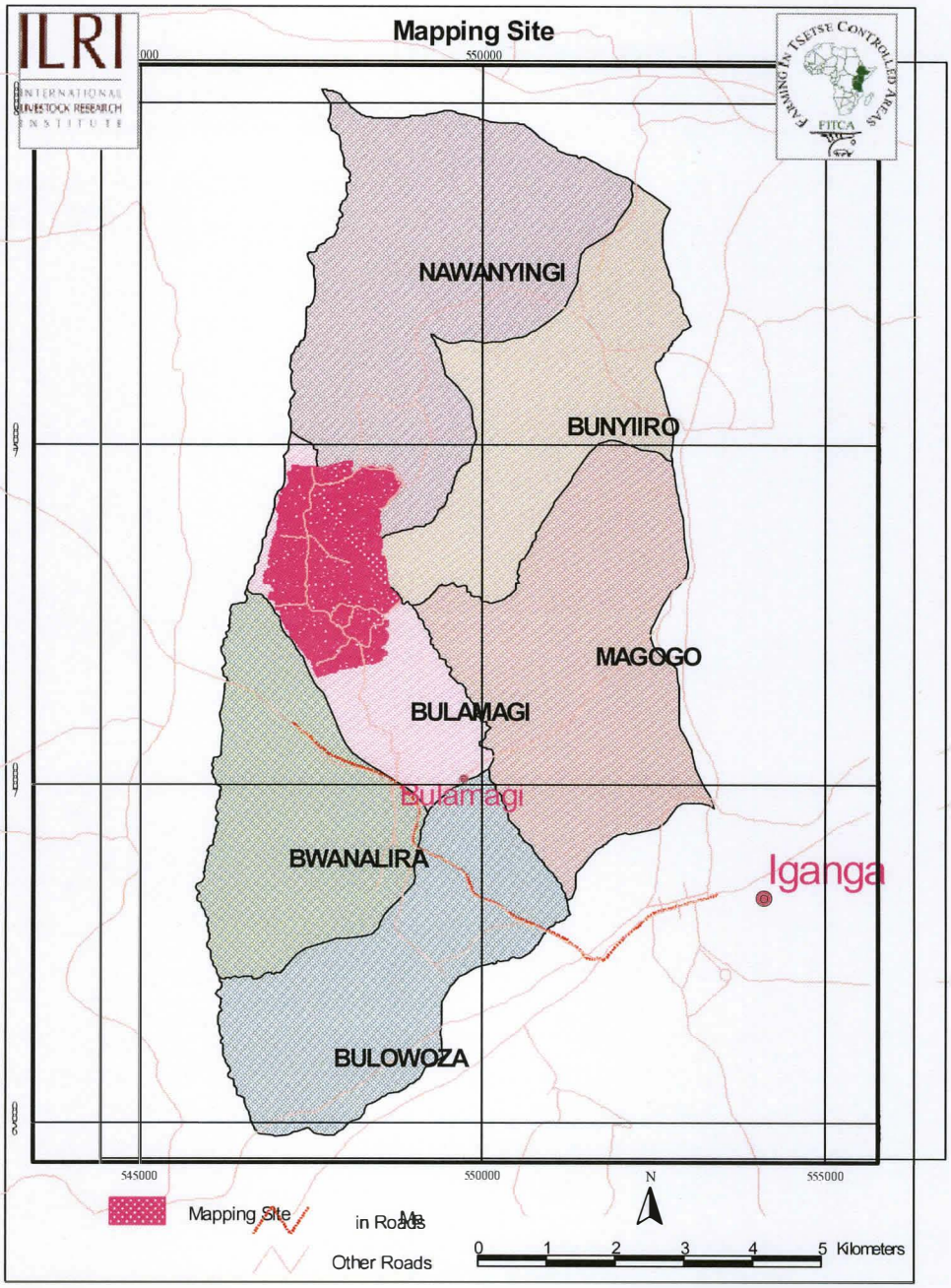
STUDY AREA

Bubaka mapping site is located in Bulamagi sub county, Kugulu county of Iganga district Uganda (Map 11). Some parts of the site are also to be found within the neighbouring parishes of Nawanyingi and Bunyiro It is situated about 10 Km north west of Iganga town near Bulamagi shopping center. Due to it is proximity to Iganga town the population density is high at about 237 people per Km^2 (Table 3). Subsequent maps illustrate the general and detailed land use generated from the survey (maps 12 and 13) while Figure 3 illustrates land use pattern in Bubaka while table 3 represents the population distribution in the study area.

Cultivated areas or cropland

Bubaka is highly cultivated where this class covered over 76 % of the total. The dominant crop was maize with over 30% cover of the total. Maize was intercropped with many of the other crops but mainly with the perennial crops of banana, coffee and cassava. The perennial crops dominated covering over 42%. Coffee was widely grown and well tended covering over 15 % of the total. Sweet potato was the next main food crop after maize and it was also widely grown with 10 % cover of the total. There were several swampy areas within which rice (both upland and swampy varieties) was grown. It was difficulty to access most of the rice fields within the swamps and the percentage cover should be higher than the 1% shown (about 2%). Vegetables such as cabbage were also grown near the swampy grounds. Very few farms had any fodder crops although this is one of the FITCA project objective of encouraging farmers to grow more of it.

MAP 11: MAP OF BUBAKA



MAP 12: MAJOR LAND USE: BUBAKA

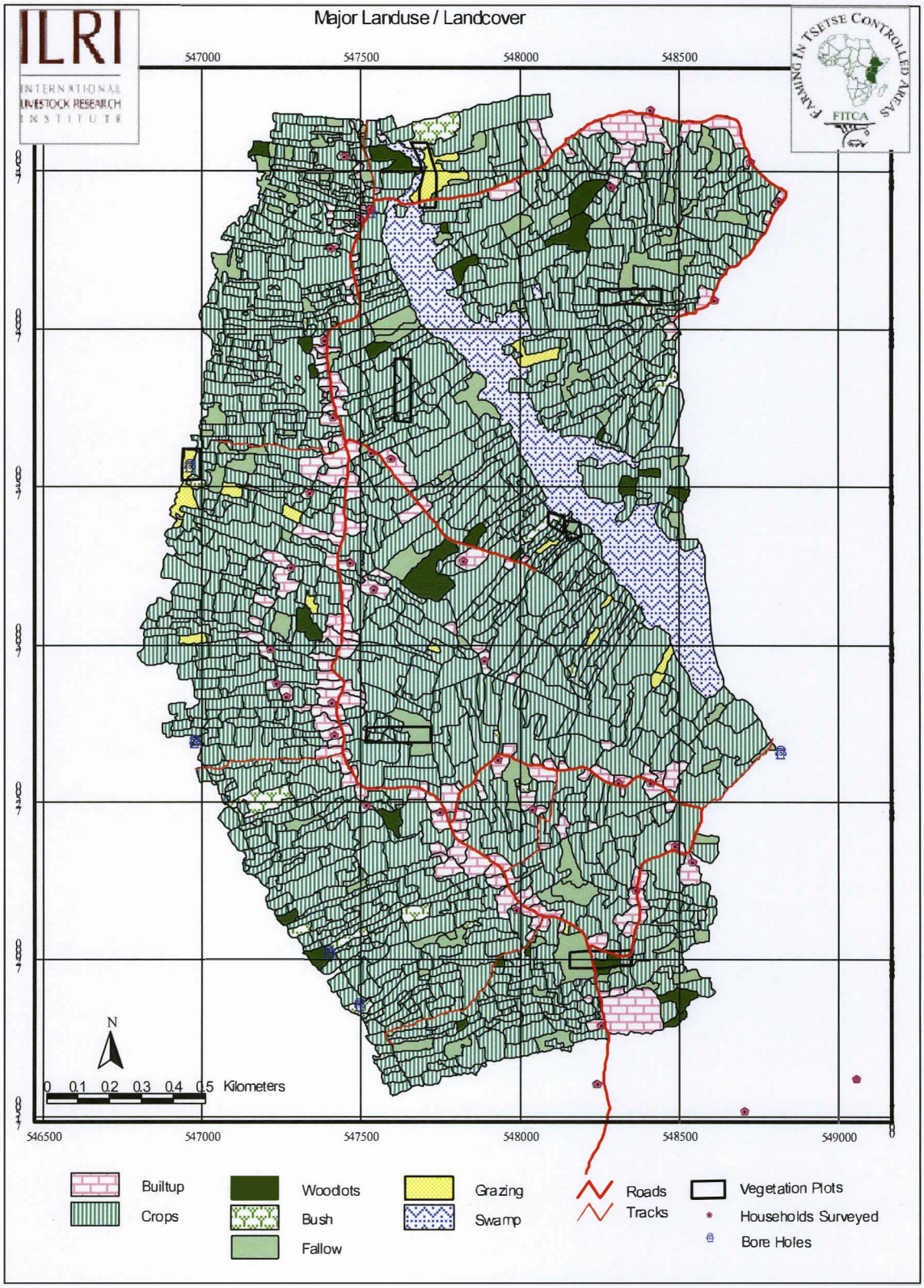
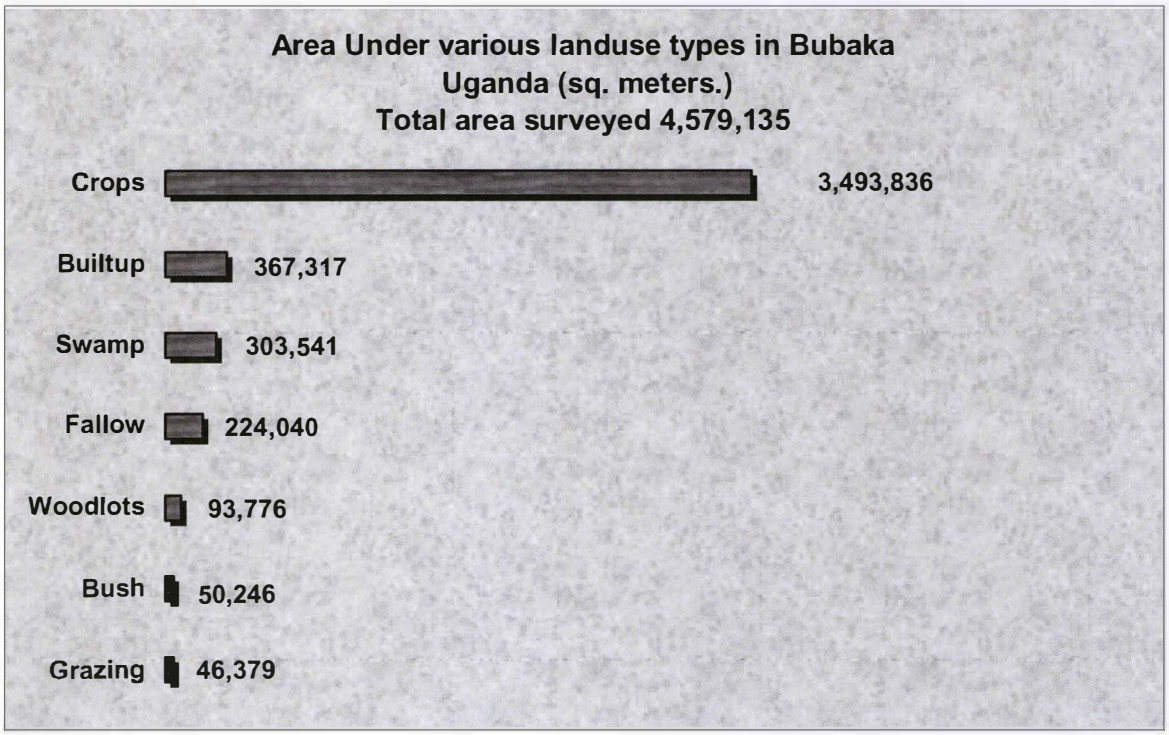


TABLE 3: POPULATION OF BUBAKA

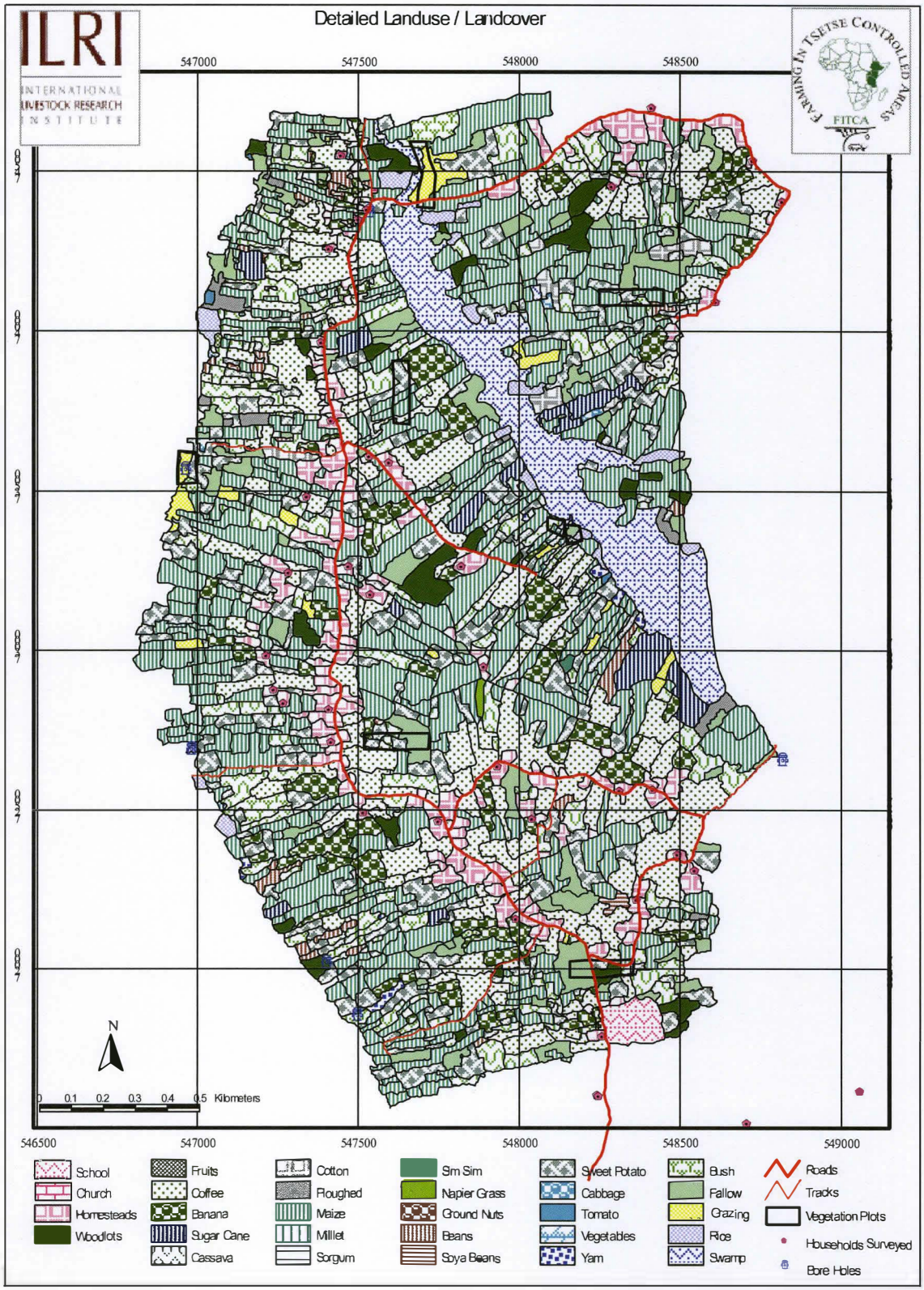
Parish Name	Area Km^2	Male	Female	Totals 1991	Density / Km2
Bulamagi	8.15	932	1005	1937	237.67
Bulowoza	12.23	1667	1797	3464	283.24
Bunyiiro	11.58	1399	1501	2900	250.43
Bwanalira	11.24	1373	1530	2903	258.27
Lwaki	11.71	1380	1535	2915	248.93
Magogo	15.46	1872	1939	3811	246.51
Nawanyingi	18.28	1846	1982	3828	209.41

Source: Population census Uganda, 1991

FIGURE 3: BAR GRAPH OF AREA COVER



MAP 13:DETAILED LAND USE: BUBAKA



Overview: Buyuba-Busiri

Buyuba-Busiri is one of the four EMMC study areas in Uganda located in Kamuli District of Uganda (Map 14). It is highly settled and widely cultivated with a few scattered bushes and fallows. The area has one of the highest incidences of human sleeping sickness. FITCA is putting a lot of effort to control the disease by supporting the community to clear the bushes and supplying them with animals and tools for animal traction. The major indicators of change expected are conversion of fallows into grazing lands and farmlands.

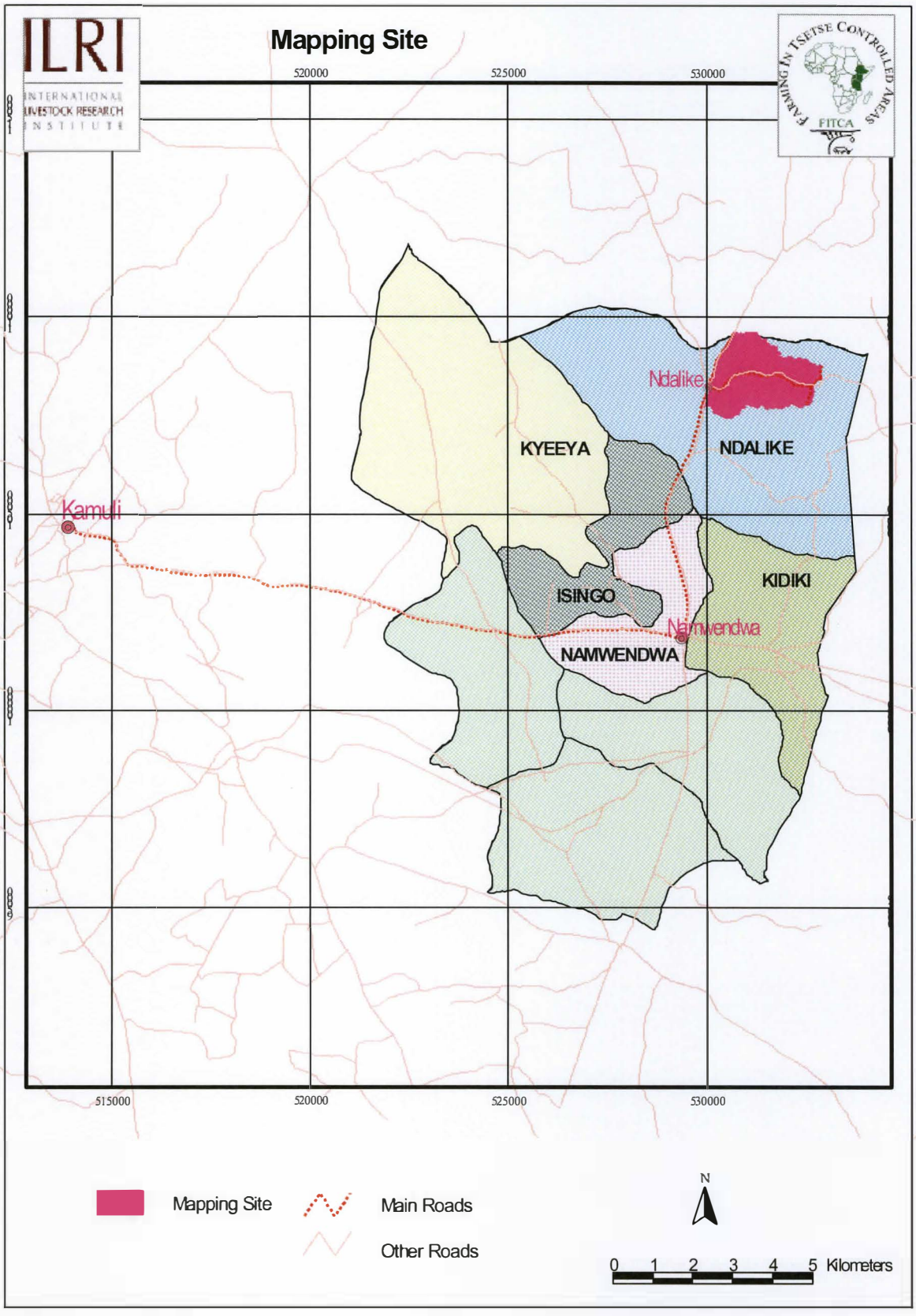
Study area

Buyuba-Busiri mapping site is located in Ndalike parish, in Namwendwa sub-county, in Kamuli district of Uganda (Map 14). It is situated about 25 Km north east of Kamuli town and about 7 Km from Namwendwa county headquarters near Ndalike shopping centre. The major land use classes are shown in maps 14 and 15, while figure 4 depicts land cover and table 4 indicates population distribution in the survey area.

Cultivated areas

Cultivated areas covered over 68 % of the total mapped land. Out of this, maize was the most extensive with over 35 % cover of the total and contributing about 50 % of the cultivated lands. Maize was intercropped with most of the other annual crops and was grown even within the perennials such as coffee and bananas and within homesteads. Other major crops grown included coffee, banana and sweet potato contributing about 30 % of the total surveyed area. Sweet potato was the next most extensive food crop after maize occupying about 10 %of the total. Coffee farms were mostly neglected and they existed as a mixture of bushes, trees or woodlots. Cassava is also grown mostly intercropped with maize.

MAP 14: MAPPING SITE BUYUBA-BUSIRI



MAP 15: MAJOR LAND USE CLASSES IN BUYUBA-BUSIRI

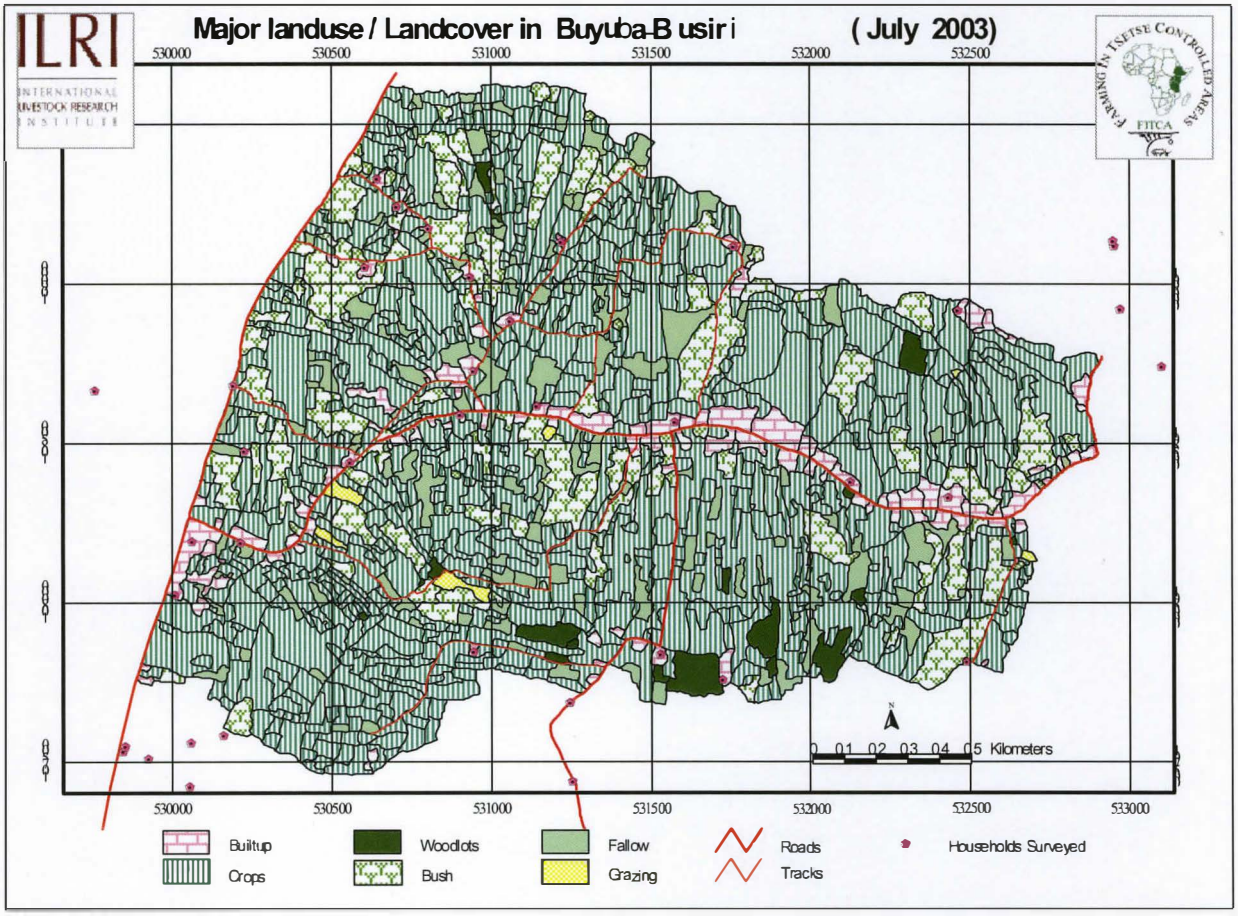
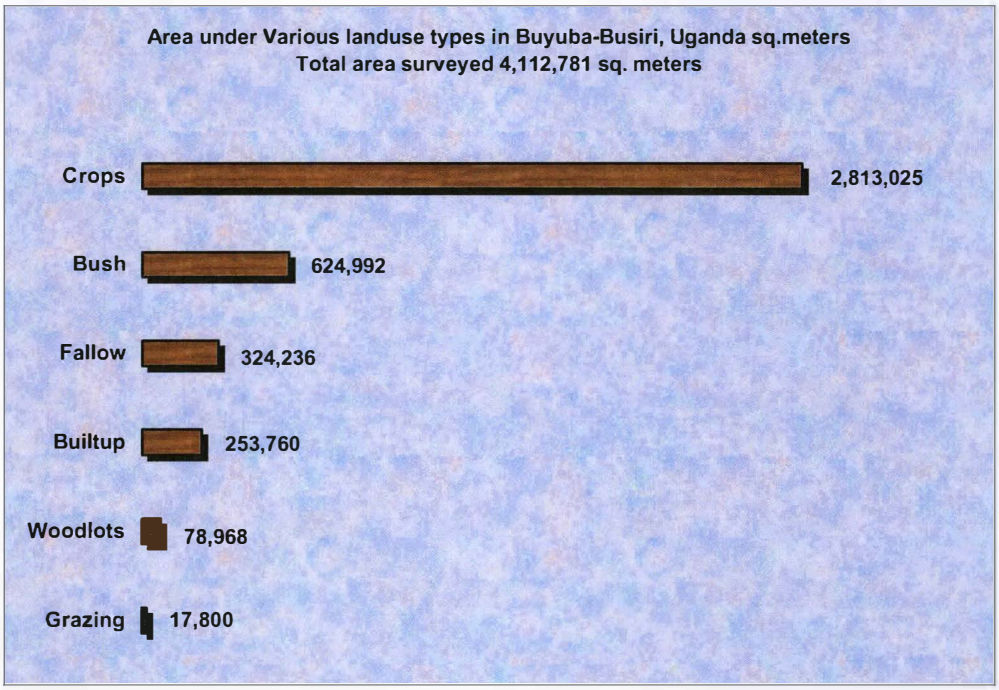


TABLE 4: HUMAN POPULATION NUMBERS IN BUYUBA-BUSIRI

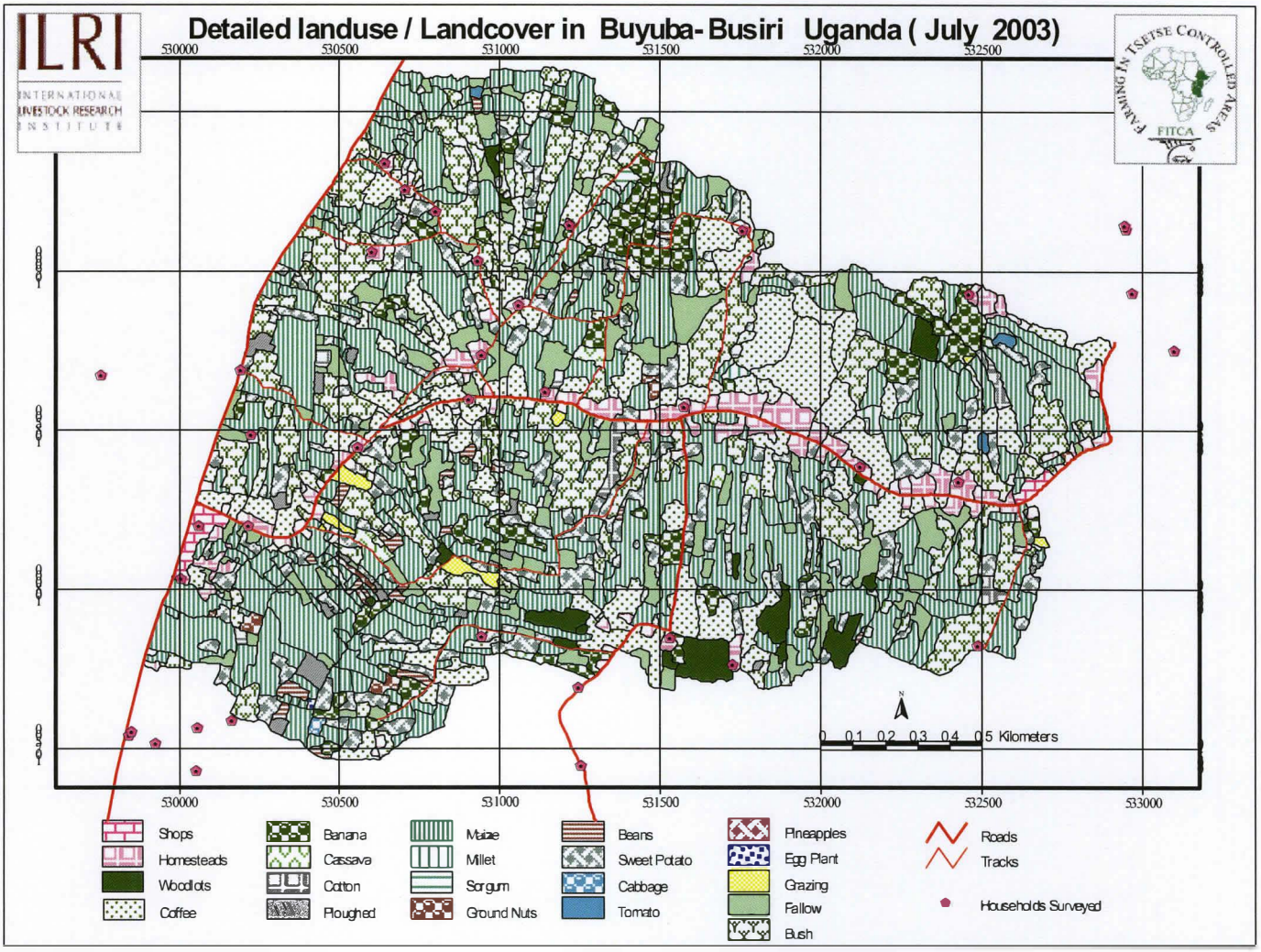
Parish Name	Area Km^2	Male	Female	Totals 1991	Density / Km2
Ndalike	31.24	2,303	2,378	4,681	149.84
Kyeeya	33.06	2,700	2,819	5,519	166.94
Isingo	10.20	957	1,010	1,967	192.84
Kidiki	14.75	1,552	1,669	3,221	218.37
Namwendwa	10.03	1,361	1,506	2,867	285.84

Source: Population census Uganda, 1991

FIGURE 4: BAR GRAPH OF AREA COVER



MAP 16: DETAILED LAND USE CLASSES BUYUBA-BUSIRI



Overview: Akoroi

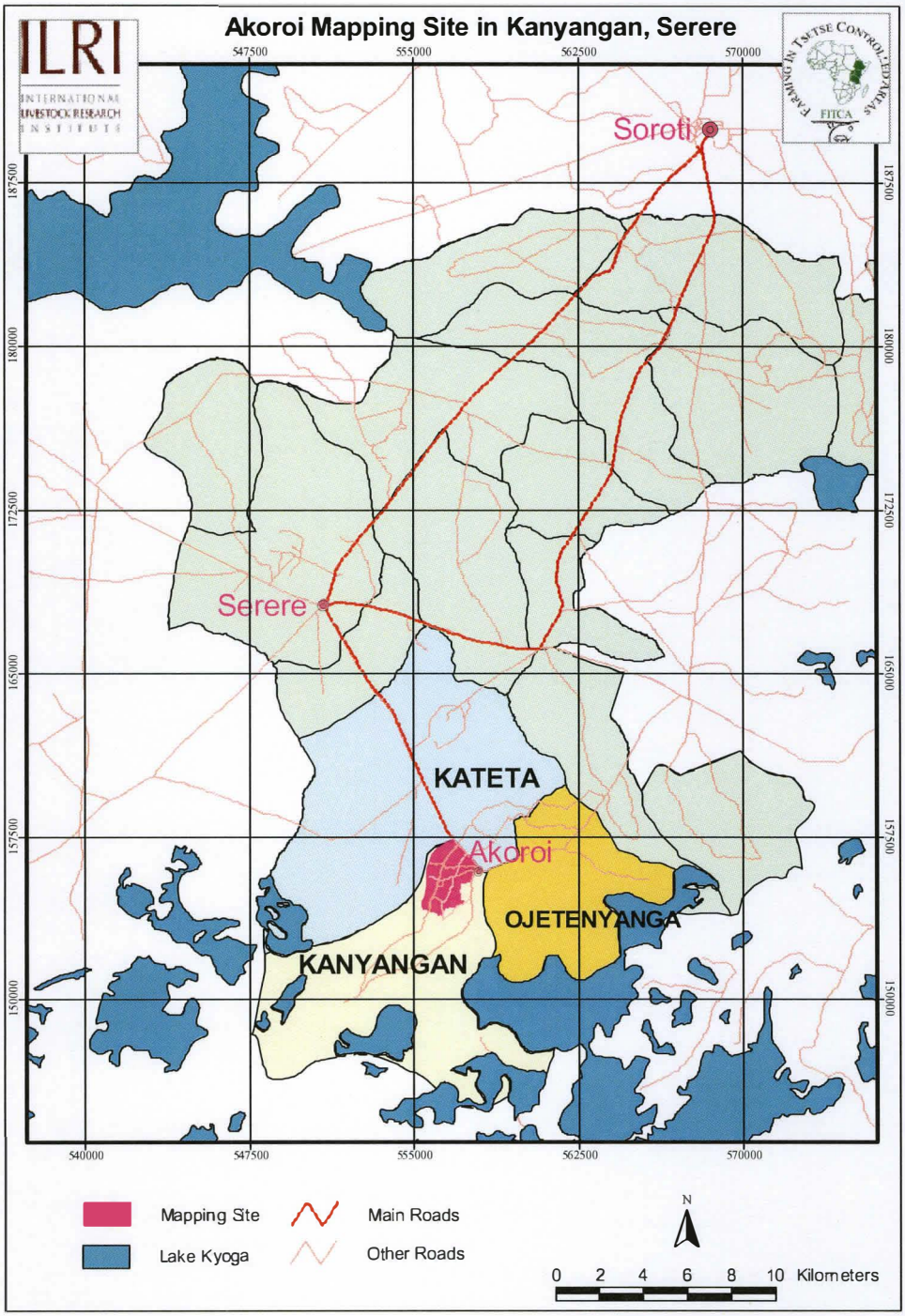
Akoroi is one of the four EMMC study areas in Uganda located in Soroti district of central Uganda bordering several swamps that form part of lake Kyoga hydrology system (Map 17). The area is sparsely settled with farming activities encroaching into the natural woodlands and forested areas. The area has high incidence of human sleeping sickness. The site was selected as a representative of areas within diseases routes due to migration of livestock between the pastoral communities in the north and agricultural communities in central and southern Uganda. The expected indicators of change include reduction in natural vegetation cover and increase of both human and livestock populations.

A unique category that was classified in this study site was what we defined as fallow cassava with over 12 % cover of the total area surveyed. This is cassava crop that is left in the farm after maturing for one year or more, this was one way of preserving cassava for use when there are shortages or during very dry years. The crop is used throughout the year when need arises. When left out for many years fallow cassava actually become bushes and even shrubs and trees start to grow within. This class was quite confusing since it can either fall under fallows or cultivated areas in the higher levels of classification. In this analysis it has been classified as a fallow and hence as part of the natural areas. The major land use classes are shown in (map 18) and the detailed cover classes are shown in (map 19) while figure 4 depicts major land use and table 4 represents the area population structure.

Cultivated areas or croplands

The cultivated areas covered about 40 % of the totals areas. Within this class the main crops were identified as millet (15 %) and cassava (12 %). Millet was mainly intercropped with maize. A few farms also had intercrops of millet with sorghum or groundnuts. The rest of cultivated land consisted of ploughed lands (6 %) and small pockets of sweet potato, maize, sorghum, beans and rice near the swamps. Cotton was also being introduced and farmers were buying cottonseeds at a subsidized price from one of the companies promoting the resumption of cotton growing in Uganda.

MAP 17: MAPPING SITE AKOROI IN SOROTI



MAP 18: MAJOR LANDUSE/LANDCOVER IN AKOROI

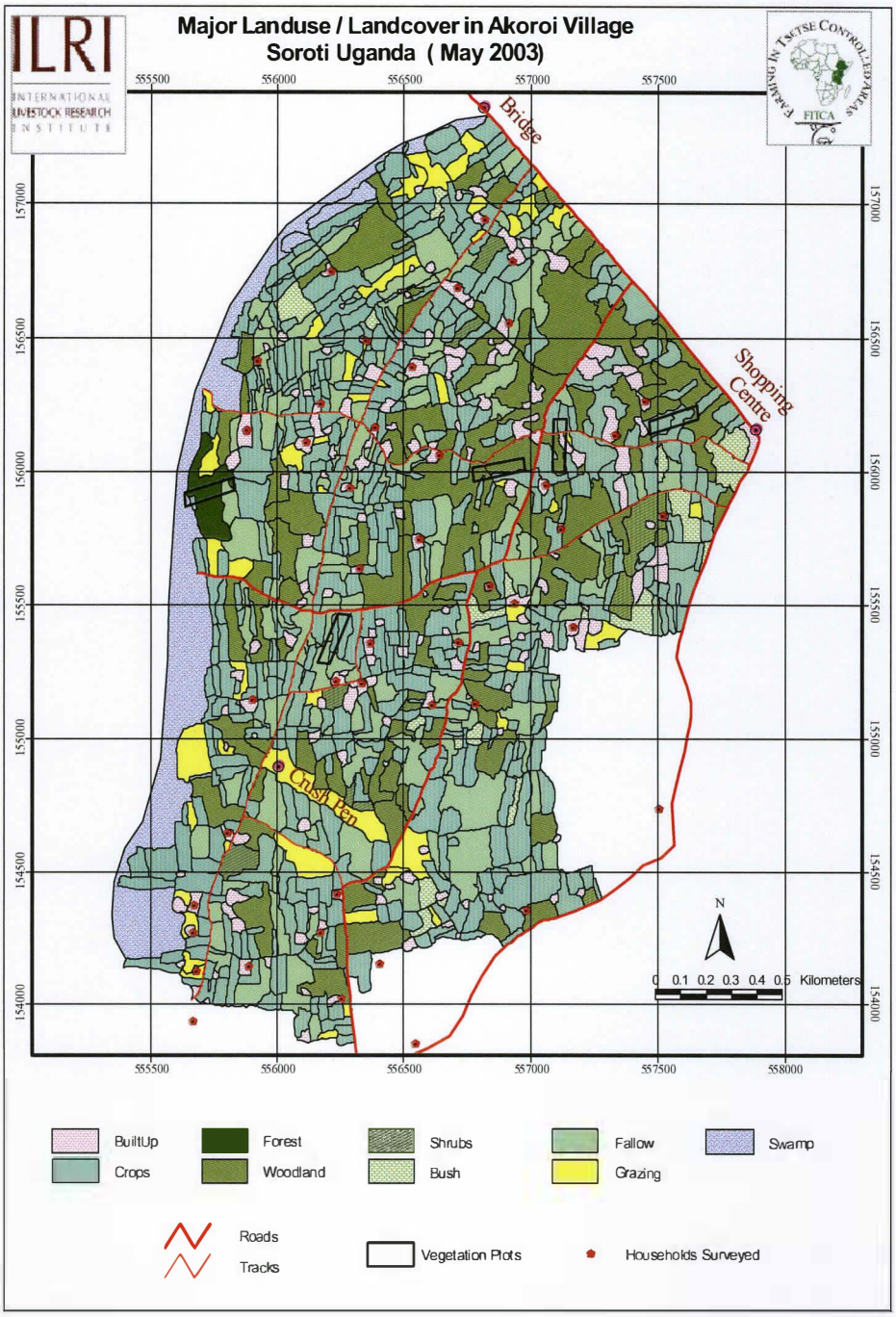
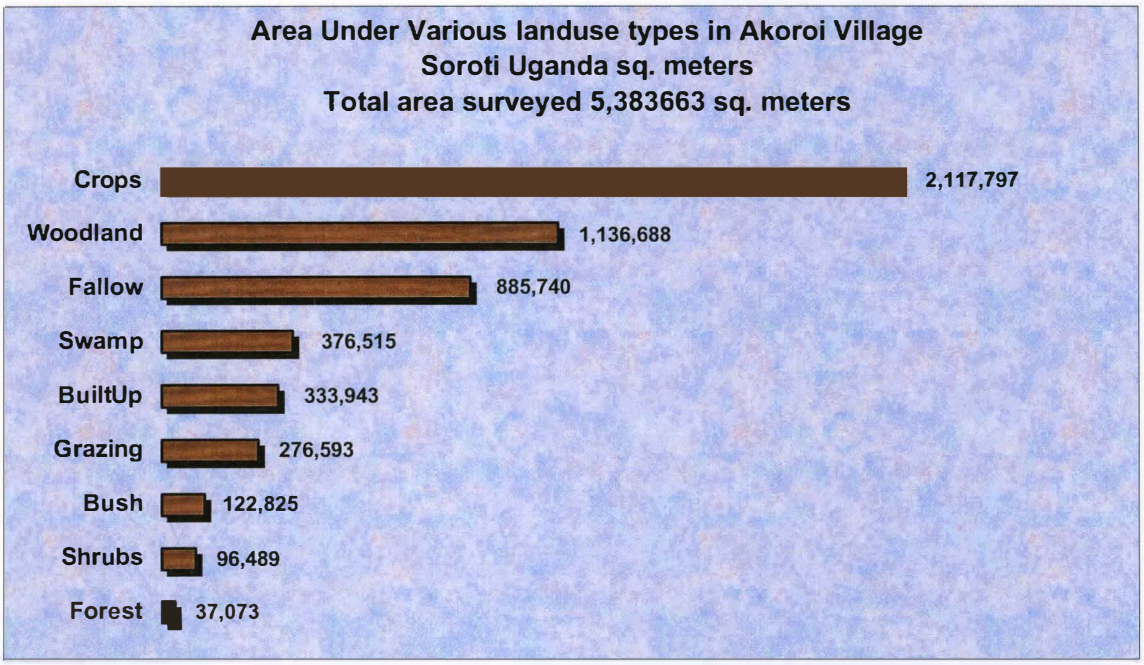


TABLE 5: HUMAN POPULATION IN KANYANGAN

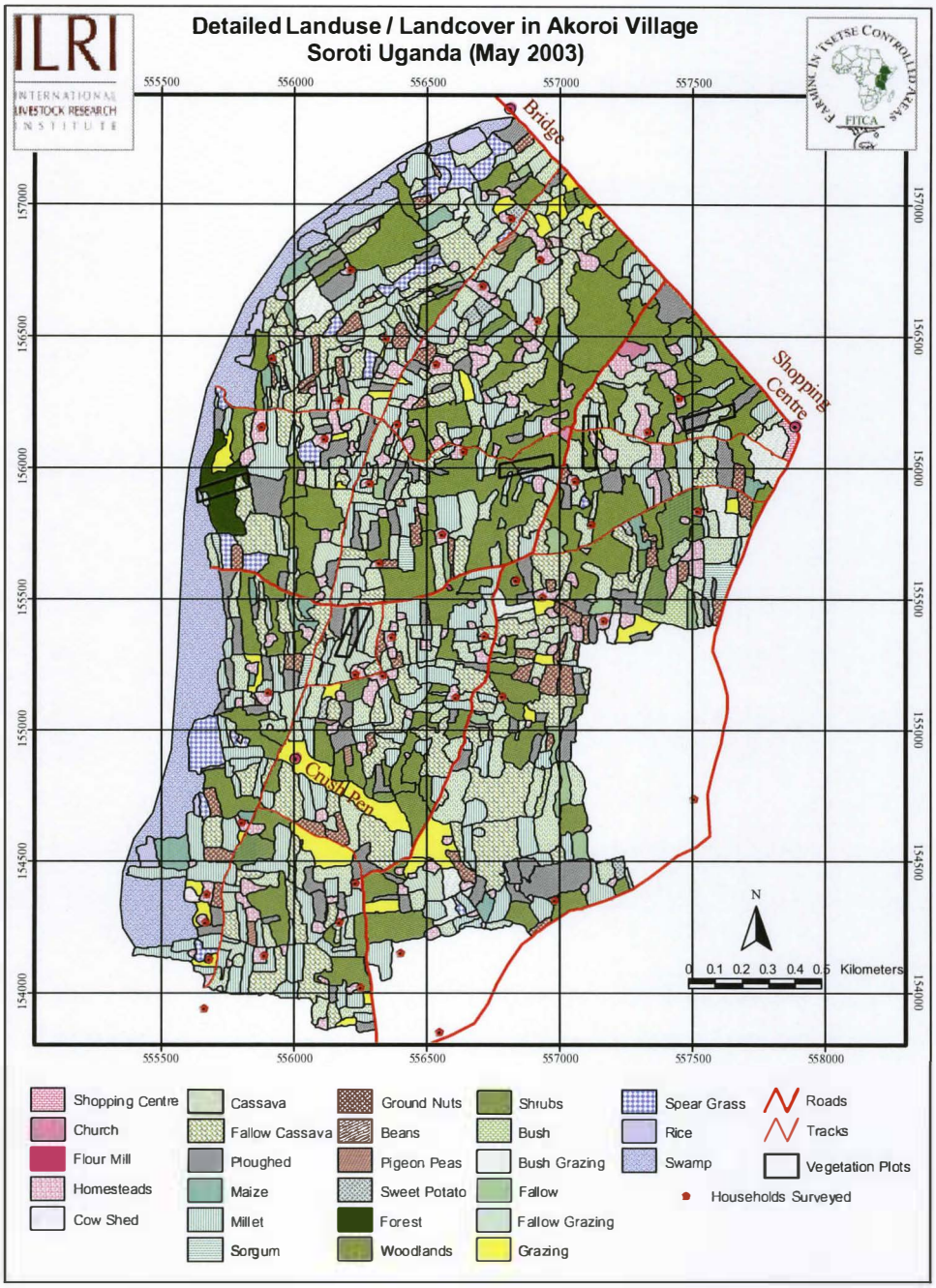
Parish Name	Area Km^2	Male	Female	Totals 1991	Density / Km2
Kanyangan	72.16	2,001	2,137	4,138	57.34
Kateta	102.94	3,804	4,080	7,884	76.59
Ojetenyanga	46.02	2,080	2,278	4,358	94.70

Source: Population census Uganda, 1991

FIGURE 5: BAR GRAPH OF AREA COVER OF MAJOR LAND USE TYPES



MAP 19: DETAILED LAND USE CLASSES AKOROI



CONCLUSION: LAND USE MONITORING

The detailed maps of land use and land cover are the first step of an environmental monitoring at village level. The EMMC sites, chosen for their particularities and the special tsetse constraints, would be particular samples areas to monitor the changes of the different categories of areas. We can remind that a social survey is realized in the same time that the mapping to get the local perception of the farmers on the changes.

The data collected and mapped constitute the basic material for several analyses. The major land use distinguishes a) natural areas as forests, swamps and savannas, b) secondary vegetation areas as fallow, grasslands, bushes, c) cultivated areas as crops and woodlots, d) areas for human living as homestead, roads, sewage... The proportion of these different areas and their respective evolution in the time are giving information of the land use, the landscape and their changes. Their evolution in location and in total area cover is linked with the human pressure on the resources.

Indicators will be extracted from these maps and the attached statistics: for example the ratio natural area/crop area, crop area/population, crop area/fallow, forest/woodlots, grassland/fodder crop (liked with the livestock production systems), grassland + Fodder crops areas/livestock number.

The monitoring is likely to include periodic visits on the same sample areas, using the same methodologies of mapping and social survey. From this monitoring will be extracted the changes of land use, of local perception on the resources, opening on interpretation of the impacts on environment. The links with the activities of communities and projects as FITCA on the agricultural systems, the land use, the protection of resources would be made possible.

These maps must become tools of monitoring for the local communities, making them able to see the effects of their activities and to take their own decisions.

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